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# THE LARVAL STAGE OF *HYDROPSYCHE SEPARATA* BANKS (TRICHOPTERA: HYDROPSYCHIDAE)

DOUGLAS SMITH

Dept. of Biol., Univ. of Saskatchewan, Saskatoon, Canada S7N 0W0

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There is some confusion concerning the name used for the species which Banks (1936) described under the name *Hydropsyche separata* Banks. Banks (1936) described the male of *H. separata* and Denning (1943) described the female, illustrated the female genitalia and provided a more complete drawing of the male genitalia of this species. Ross and Spencer (1952) suggested *H. separata* described from North America was a synonym of the European species *Hydropsyche guttata* Pictet. Ross (1965), in a primarily zoogeographical paper, stated that *H. guttata* and *H. separata* were distinct species. Personal communications with other Trichoptera taxonomists and the published literature (e.g., Baumann and Winget, 1975), however, indicate that the name *H. guttata* is still used to refer to the species *H. separata*.

## Discussion

Dr. Hans Malicky (from the Biologische Station Lunz, Lunz, Austria) kindly sent me male specimens of *H. guttata* and I sent him males of *H. separata*. After comparing these two species we concluded that they are distinctly different (even the number of tibial spurs differ in the males). This conclusion supports Ross's (1965) view that the species *H. guttata* and *H. separata* are separate species and that the name *H. guttata* should not be used to refer to the species *H. separata* which Banks described in 1936.

Ross (1965) suggested that *H. separata* and *H. guttata* are daughter species of a common ancestor but Dr. Malicky (pers. comm., 1977) found that, based on male specimens, *H. separata* is more closely related to a European species which he had recently described (Malicky, 1977), *Hydropsyche bulgaromanorum* Malicky, than to *H. guttata*.

Dr. A. P. Nimmo (oral comm., 1978) notes that the species *Hydropsyche corbeti* Nimmo which he described (Nimmo, 1966) may be a synonym of *Hydropsyche separata*. The drawing of the male genitalia of *H. separata* in Denning (1943) and the male genitalia of specimens of *H. separata* which I examined are extremely similar to the drawings of the male genitalia of *H. corbeti* presented by Nimmo (1966). Since I have not, as yet, examined the type of *H. corbeti*, I can only state that my observations on the close

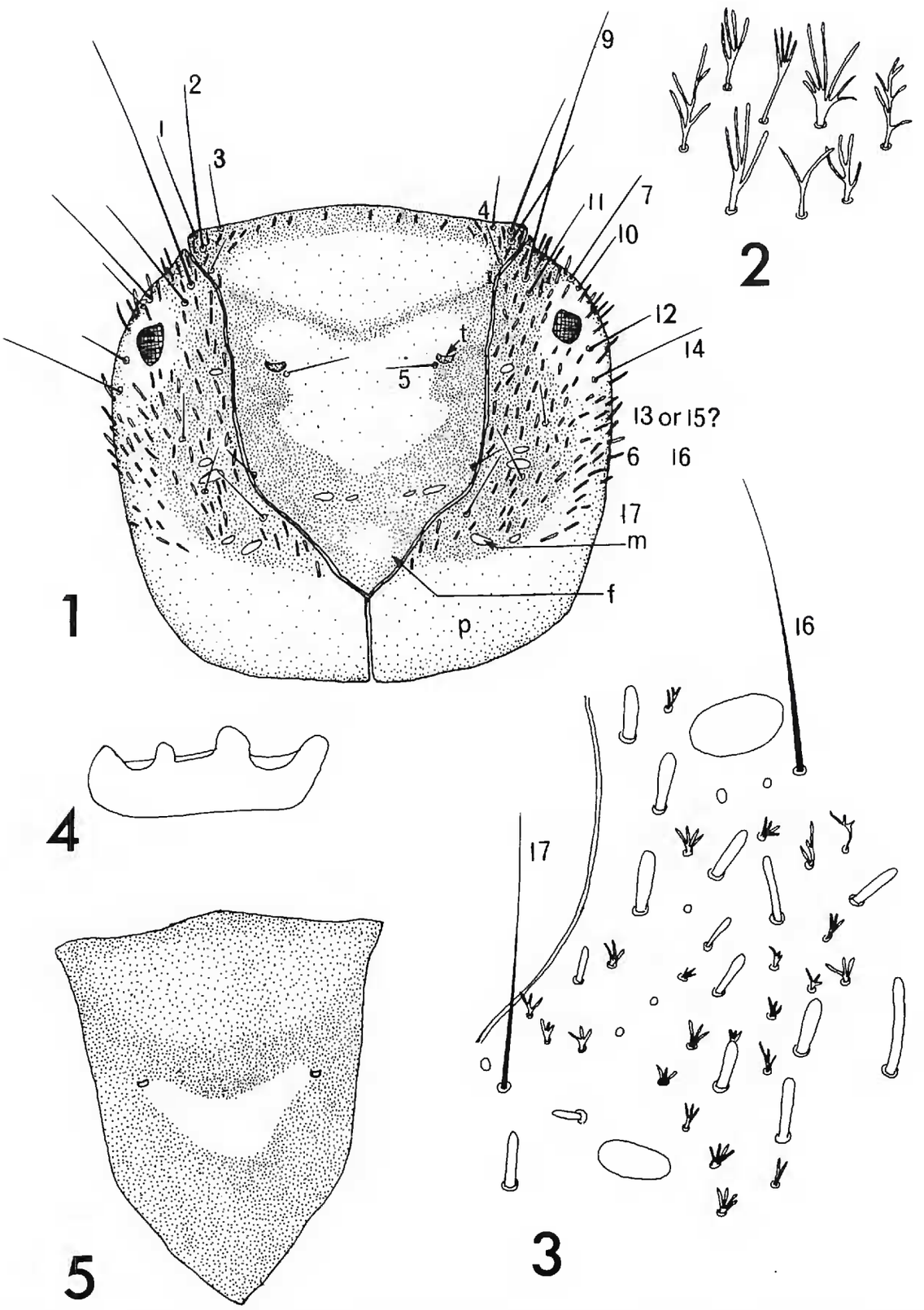
similarity of the genitalia of *H. corbeti* and *H. separata* suggest Nimmo is correct in regarding *H. corbeti* as a possible synonym of *H. separata*.

## The Larval Stage of *Hydropsyche separata*

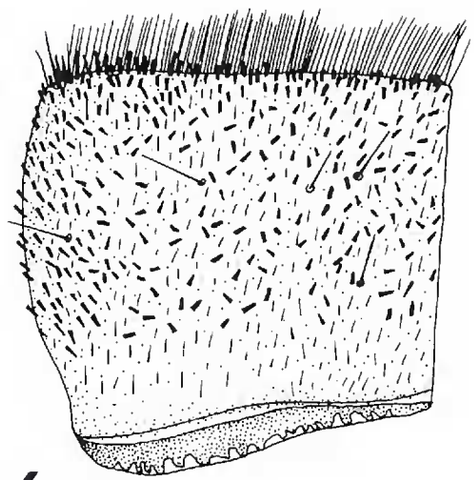
The most distinctive features of the *H. separata* larva are the pattern on the dorsum of the head, the prominent bump on the meson of the anterior margin of the anterior ventral apotome, the fine, branched hairs on the frontoclypeal apotome, the mandibles which have a deep lateral furrow bearing several setae and the relatively long, wide, scale-like setae on the abdominal terga.

In the detailed description of the larva which follows, the terminology used is taken primarily from Wiggins (1977).

*General description.*—Dorsum of head dark with lighter markings, sides and venter yellow, often with a pair of dark patches on venter. Rarely, head entirely dark except for region about each eye. Frontoclypeal apotome (Figs. 1, 5) slightly indented laterally; anterior margin convex, often with minute bumps along edge, minute branched setae on lateral portions of anterior margin; anterior portion of apotome with short scale-like setae behind anterior margin and on anterolateral surface but otherwise bare of such setae, often with large light oval area on middle; middle of apotome with V-shaped (Fig. 5) or lyre-shaped (Fig. 1) light area or rarely, light area absent, tentorial pits distinct, often four or five light muscle scars anterad of tentorial pits in a shallow, transverse depression; posterior portion of apotome with two to four light muscle scars in middle, structure illustrated in Figure 4 evident in cleared specimens within cuticle of apotome in light area near vertex of frontoclypeal apotome (structure approximately one-quarter as wide as the frontoclypeal apotome at level of seta 6) posterad of four muscle scars; posterior three-quarters of apotome covered with fine, branched setae (Fig. 2). Each parietal sclerite with numerous short scale-like setae and smaller, branched, fine setae (Fig. 3) on dorsal and lateral regions of anterior three-quarters of head (Fig. 1); pair of light muscle scars anterad of seta 16 (Fig. 1), a single light muscle scar above eye near frontoclypeal suture, often several lighter muscle scars in posterior region of dorsum. Head setae 1 and 3 along anterior margin of frontoclypeal apotome (Fig. 1); seta 2 posterad of seta 1; seta 4 posterad of seta 2; seta 5 near posteromesal margin of tentorial pit; seta 6 near frontoclypeal suture at level of seta 16; setae 7 and 10 anterad of eye; setae 9 and 11 anterad and dorsad of eye; setae 12 and 14 posterad and ventrad of eye; setae (13 or 15?) anterad and laterad of seta 16; seta 16 posterad of pair of small muscle scars near frontoclypeal suture; seta 17 beside frontoclypeal suture where frontoclypeal apotome begins to narrow to posterior tip; seta 8 on lateral surface near anterior margin of head; seta 18 in middle of ventral surface of parietal




Figs. 1–5. Morphological features of *Hydropsyche separata*. Fig. 1—Head, dorsal aspect; t = tentorial pit, f = frontoclypeal apotome, m = muscle scar, p = parietal sclerite. Fig. 2—Setae on posterior portion of frontoclypeal apotome. Fig. 3—Setae on dorsum of parietal sclerite. Fig. 4—Structure within cuticle near posterior tip of frontoclypeal apotome (arrow extending from f in Fig. 1 indicates approximate position of structure). Fig. 5—Frontoclypeal apotome showing only coloration.



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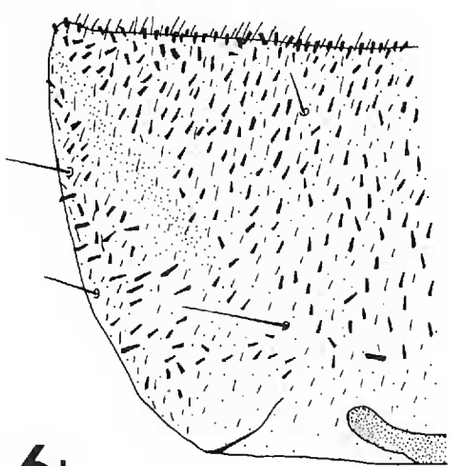

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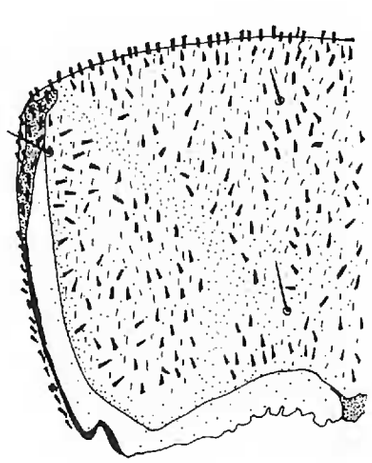

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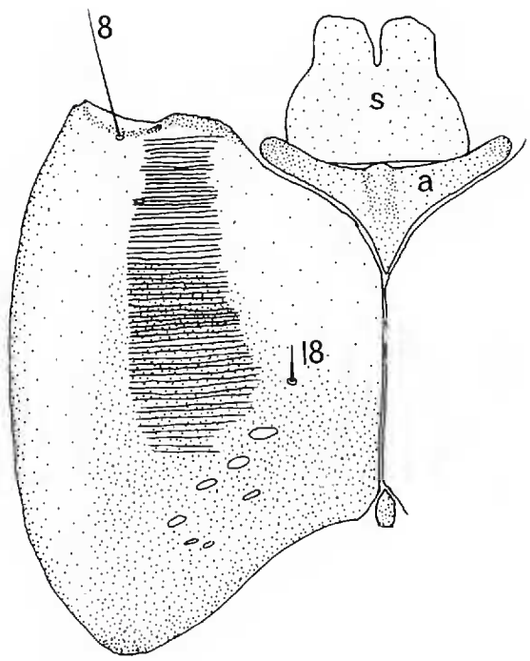


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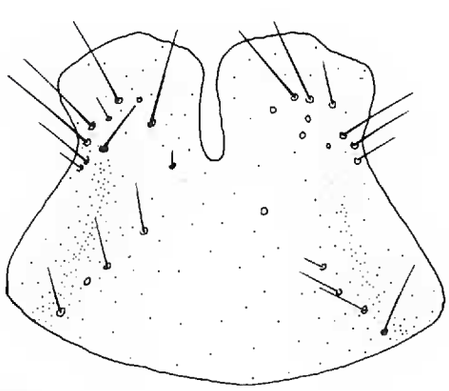

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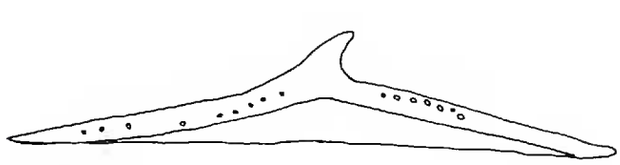

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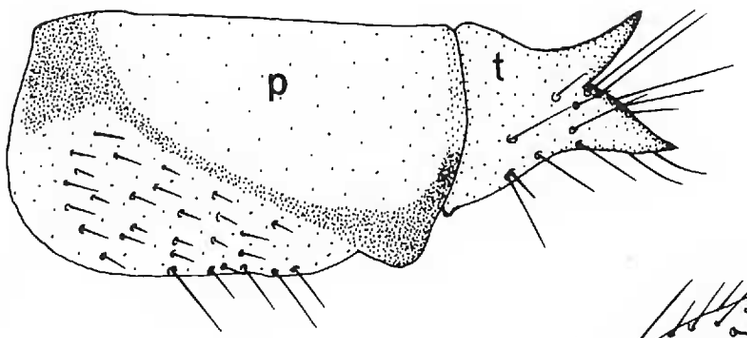
Figs. 6–9. Morphological features of *Hydropsyche separata*. Fig. 6—Left side of thoracic nota; a = pronotum, b = mesonotum, c = metanotum. Fig. 7—Right side of head capsule, ventral aspect; s = submentum, a = anterior ventral apotome. Fig. 8—Submentum, ventral aspect. Fig. 9—Tooth from proventriculus.

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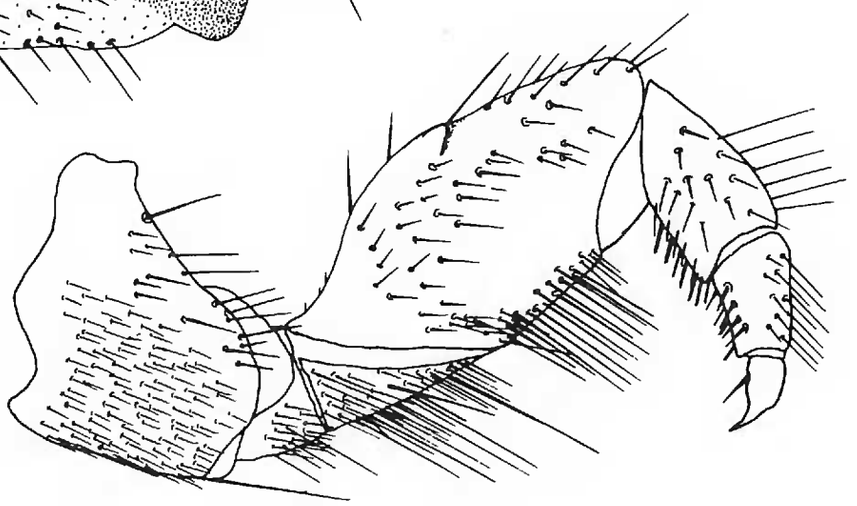

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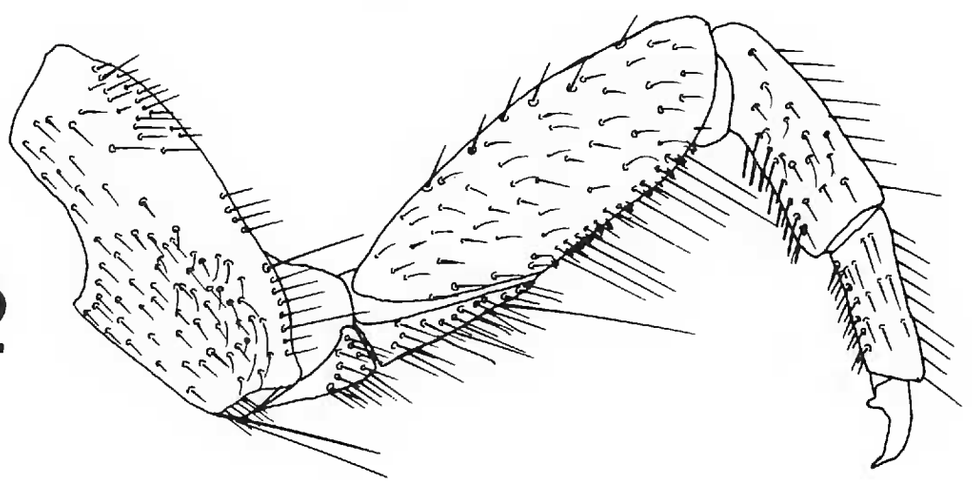

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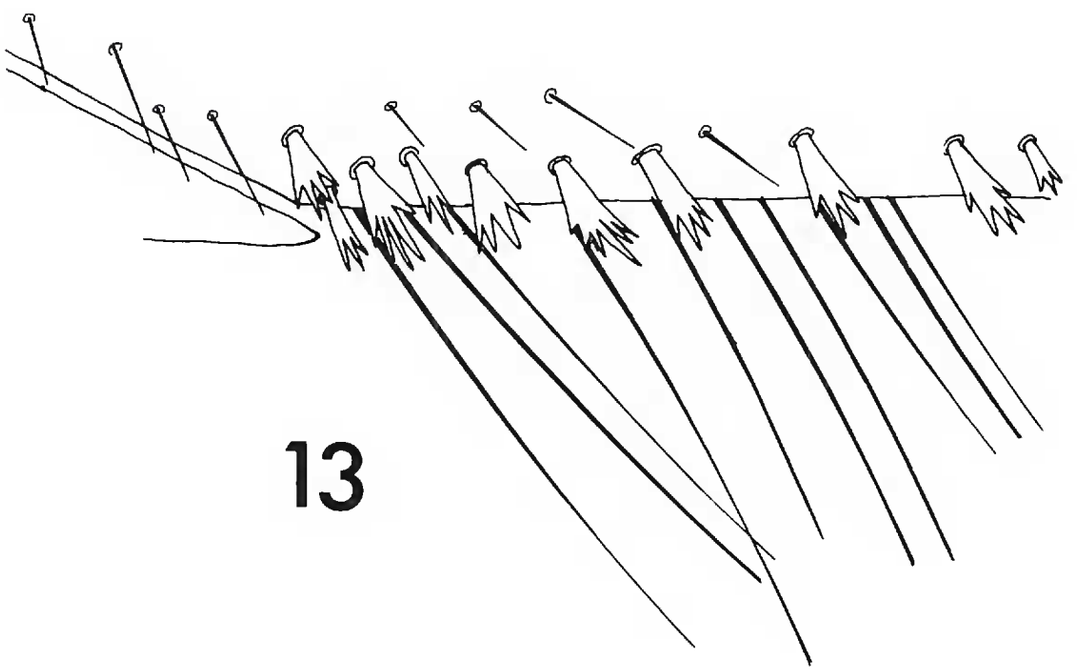

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sclerite (Fig. 7); setae 3, 4, 5, 6, 10, 12, (13 or 15?), 16 and 17 short, setae 1, 2, 7, 8, 11 and 14 medium and seta 9 long in length. Labrum with a dense covering of short unbranched setae on anterior three-quarters of dorsum, one pair of setae near anterior margin longer than other setae. Mandibles (Fig. 14) with a deep lateral trough, numerous setae along base of trough. Left mandible (Fig. 14a) with an apical and subapical tooth on dorsal part, brush of small setae near mesal margin of subapical tooth; ventral part with an apical and four subapical teeth, basal subapical tooth short, rounded triangular, a brush of long setae above basal tooth. Right mandible (Fig. 14b) with a single tooth on dorsal part, brush of small setae situated obliquely on tooth; ventral part with an apical and four subapical teeth; basal subapical tooth short rounded triangular. Submentum (Fig. 8) with lateral surface on each side bulging upward from base of apical lobe posterad to posterolateral corner; setae grouped near base of each apical lobe and in an oblique line on each posterolateral corner; anterior margin of each apical lobe rounded or rounded triangular. Anterior ventral apotome (Fig. 7) with a bump on meson near anterior margin; lateral arms long, narrow, enlarged slightly at apex. Proventricular teeth of foregut each with a single apical denticle (Fig. 9), long basal portion with several scattered bead-like areas, support bars absent.

Pronotum, mesonotum and metanotum (Figs. 6a, b, c) each yellow to brown, covered with a dense covering of short scale-like setae and even shorter pointed setae (Fig. 6); pronotum (Fig. 6a) with scale-like setae only on anterior three-quarters, anterior margin with numerous fine setae; mesonotum (Fig. 6b) and metanotum (Fig. 6c) each with scale-like setae projecting beyond anterior margin. Trochantin of propleuron (Fig. 10) with numerous setae along ventral portion, dorsal apical lobe upturned and pointed. Foreleg with minute branched setae on most of posterior surface of coxa; femur with prominent lobe on middle of anterodorsal surface (Fig. 11). Midleg with branched setae only on ventral part of posterior surface of coxa; femur (Fig. 12) with branched setae on anteroventral surface (Fig. 13); no branched setae on tibia or tarsus. Hindleg without branched setae on posterior surface of coxa; femur with branched setae on anteroventral surface; tibia and tarsus without branched setae. Mesosternum with one pair of gills, each gill with a single trunk; metasternum with two pairs of gills, each gill with a single trunk.

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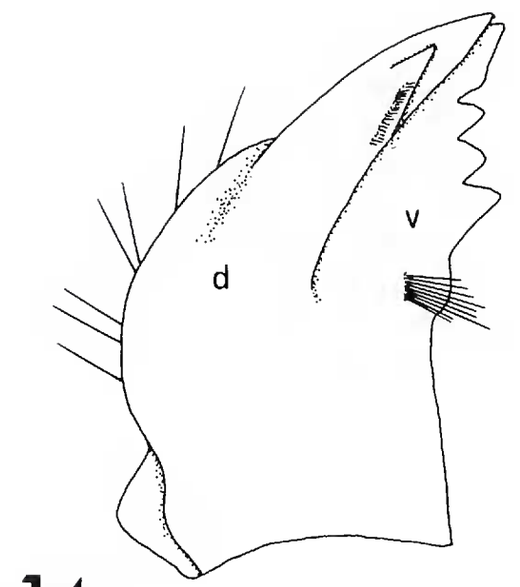
Figs. 10–13. Morphological features of *Hydropsyche separata*. Fig. 10—Trochantin and propleuron, lateral aspect; t = trochantin, p = propleuron. Fig. 11—Foreleg, anterior aspect. Fig. 12—Midleg, anterior aspect. Fig. 13—Ventral margin of femur, anterior aspect showing branched setae.

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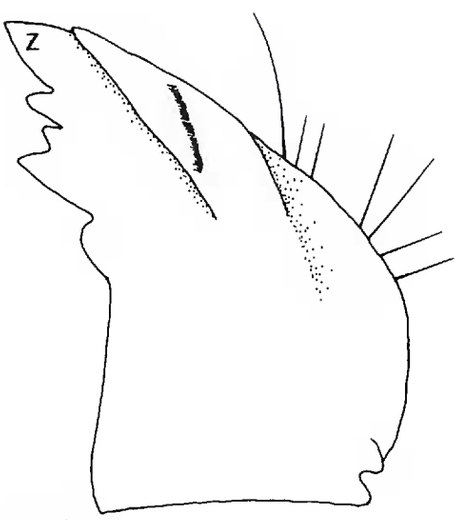


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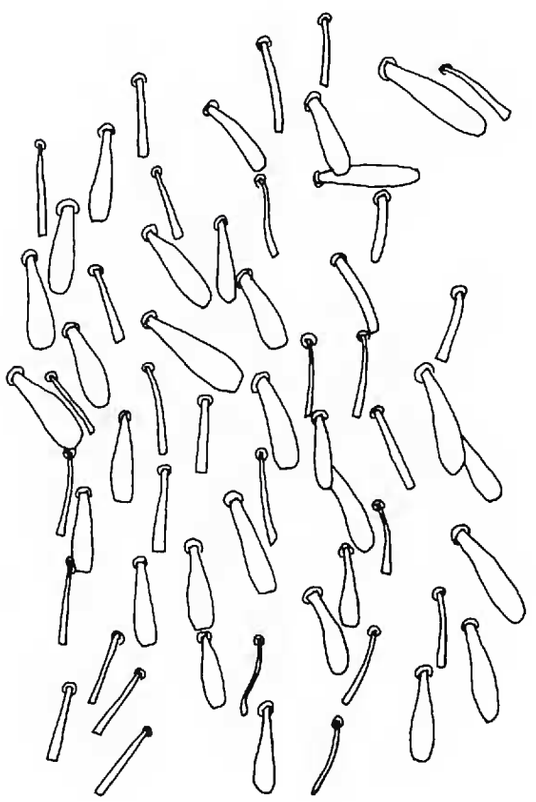

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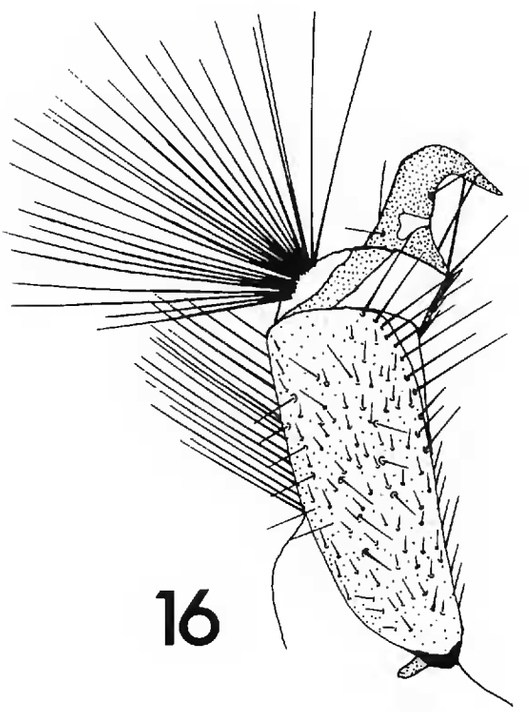

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Figs. 14–16. Morphological features of *Hydropsyche separata*. Fig. 14—Mandibles, dorsal aspect; a = left mandible, b = right mandible, d = dorsal part, v = ventral part, z = apical tooth of ventral part. Fig. 15—Scale-like setae on abdominal terga. Fig. 16—Anal proleg, lateral aspect.

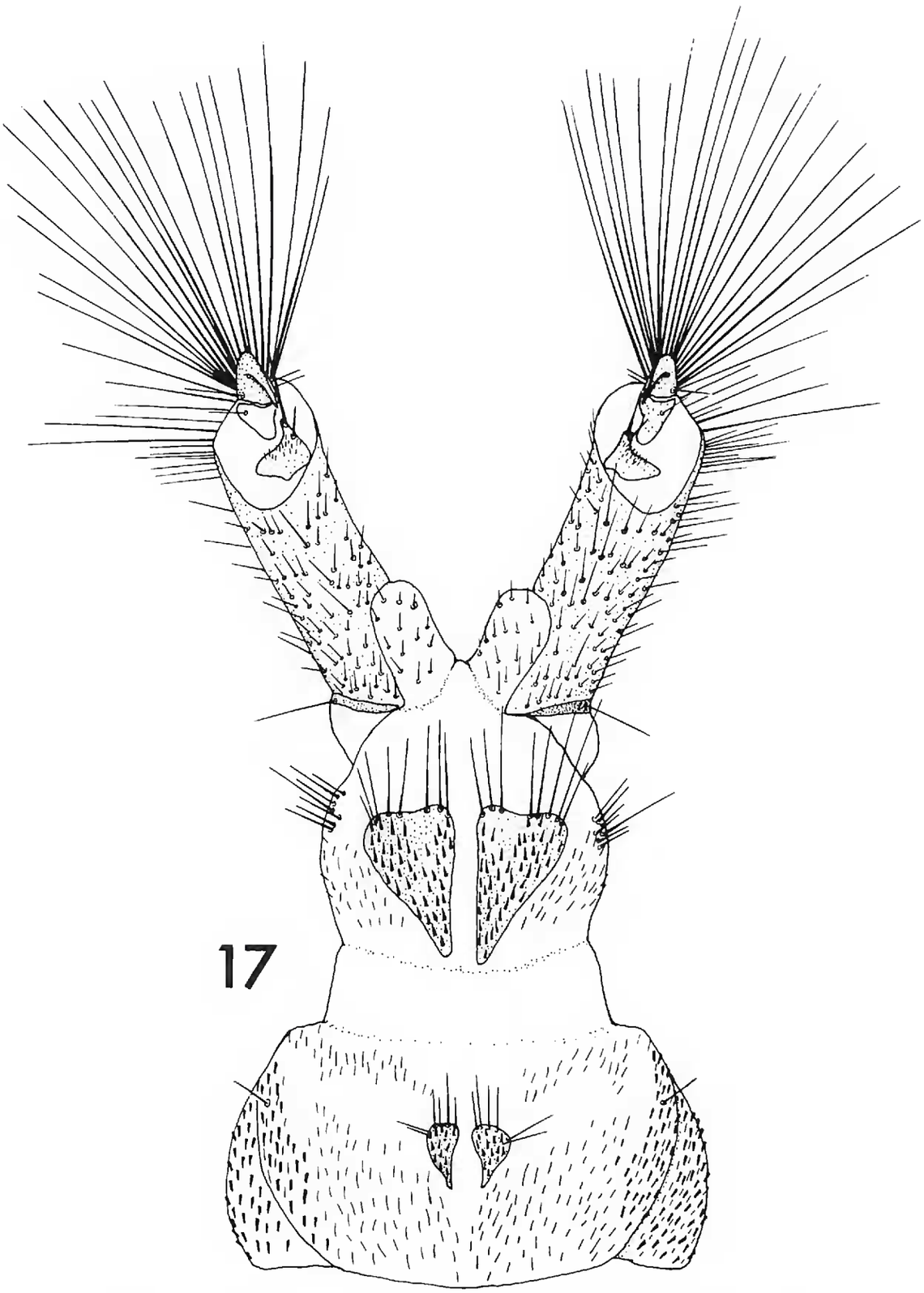


Fig. 17. Posterior end of abdomen, ventral aspect, of *Hydropsyche separata*.

Abdomen with small scale-like setae (Fig. 15) covering terga, many of these setae longer and/or stouter than in other species of the genus. First segment with two pairs of gills on sternum, each gill with a single trunk; segments II to VI each with one pair of medial gills, each gill with a single

trunk and one pair of lateral gills, each gill with a main trunk and two main branches; segment VII with one pair of gills, each gill with a main trunk and two major branches. Sterna of segments VIII and IX each with a pair of spine bearing plates (Fig. 17). Ninth tergum with a small lateral sclerite on each side. Anal proleg without spine-like setae on ventral surface (Figs. 16, 17).

Mature larvae up to 20 mm in length.

*Material examined.*—Includes 225 adults, 76 of which were reared from pupae and 637 larvae.

*Disposition of material.*—A series of adult and larval specimens of *Hydropsyche separata* will be deposited in the Royal Ontario Museum. The remainder of the specimens will be retained in the Entomology Museum of the Biology Department, University of Saskatchewan and in the author's personal collection.

## Biology and Distribution

*H. separata* in the Saskatchewan River system in Saskatchewan, Canada has a single generation per year with an extended emergence period. Pupae were collected from May 26 to August 1, adults from May 8 to August 24. The main emergence of adults occurs in June and July. Larval collections on any one date usually contain several different instars which is usual in aquatic insect species with broad adult emergence periods. Baumann and Winget (1975) found larvae of *H. separata* to be primarily herbivorous and detrivorous feeders. The gut contents of two larval specimens of this species from the Saskatchewan River system were found to contain primarily plant material.

*H. separata* is widely distributed in northern North America from New York State west to British Columbia and Utah (various sources) and north to Great Slave Lake (Rawson, 1953). Baumann and Winget (1975) collected *H. separata* from the turbid waters of the relatively large White River in Utah. In Saskatchewan *H. separata* is abundant in larger turbid rivers such as the Saskatchewan, South Saskatchewan, North Saskatchewan and Battle Rivers. This species does not occur in the clear, often rapid streams of the boreal forest region of Saskatchewan. In the South Saskatchewan River the Diefenbaker Lake reservoir not only alters the seasonal temperature regime of the river downstream from it (Lehmkuhl, 1972) but it also acts as a trap for suspended matter which is brought into the reservoir by the turbid waters of the South Saskatchewan River. The water which leaves the reservoir is relatively free of suspended matter. Lehmkuhl (1972) suggested that aquatic insects are eliminated directly downstream from the Diefenbaker Lake reservoir because the annual temperature cycle of the river is altered. Further downstream, a gradual recovery of the insect fauna occurs and at Saska-

toon, approximately 70 miles downstream from the reservoir many species of aquatic insects are able to live. Collections from the South Saskatchewan River upstream from the reservoir and in the river downstream from the reservoir at Saskatoon and at several sites downstream from Saskatoon indicate that although *H. separata* is the dominant net-spinning caddisfly species upstream from the reservoir, downstream from the reservoir *Symphitopsyche recurvata* (Banks) (=*Hydropsyche recurvata* Banks) replaces *H. separata* as the dominant net-spinning species. Temperature is not likely the factor causing this change in the abundance of these two species since both species do occur upstream and downstream from the reservoir. It is more likely that the difference in the turbidity of the water upstream and downstream from the reservoir is the major factor affecting the abundance of *H. separata* and *S. recurvata* in the South Saskatchewan River. The collection of *H. separata* from the White River in Utah by Baumann and Winget (1975), the distribution of *H. separata* in the province of Saskatchewan and the distribution of this species within the South Saskatchewan River indicate that *H. separata* prefers or requires stream habitats where the water is very turbid.

## Acknowledgments

I wish to express my sincere thanks to Dr. D. M. Lehmkuhl for his supervision and encouragement during the course of my studies, for making available facilities and equipment without which this research would not have been possible, for financial support from his National Research Council grant and for his constructive criticisms during the preparation of this paper. Special thanks go to Dr. Hans Malicky whose many useful comments and generous help have aided me in the publication of this paper. I would also like to thank Dr. C. Gillott and Dr. L. Burgess for reviewing the manuscript.

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## SCIENTIFIC NOTE

# NEW HOST RECORD FOR *CORYTHUCA DISTINCTA* (HEMIPTERA: TINGIDAE)[1]

Drake and Ruhoff (1965, Lacebugs of the world: a catalog. U.S. Natl. Mus. Bull. 243: 148) record the host plants of *Corythuca distincta* Osborn & Drake as being *Carduus lanceolatus* and *Cnicus* sp. (Compositae), *Lathyrus nuttalii* (Leguminosae) and hollyhock (=*Althaea* sp.) (Malvaceae). Specimens of *C. distincta* nymphs and adults (identified by R. C. Froeschner, U.S. Natl. Mus) were collected feeding on *Cirsium pulcherrimum* (identified by Burrell Nelson, Rocky Mountain Herbarium, Univ. Wyoming, Laramie) on July 28 and August 1, 1978 at Centennial, Wyoming. Not all the *Cirsium* plants in the patch were infested, but on severely infested plants, the tingids were present in such densities that all leaves were curled and necrotic. It was presumed that such plants would die. This infestation appeared to be an example of natural control by a native insect. According to Drake and Ruhoff (Ibid. 454–455), the only previous records for tingids feeding on *Cirsium,* are limited to five species of *Tingis* which feed on thistle in the Old World and in Asia.

### Footnote

[1] Published with the approval of the Director, Wyoming Agricultural Experiment Station, as Journal Article MP-42.

Robert Lavigne and Don Roth, *Plant Science Division, Box 3354, Univ. Stn., University of Wyoming, Laramie, 82071.*